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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<p>(51) International Patent Classification ⁶ : A61B 17/70</p>	<p>A1</p>	<p>(11) International Publication Number: WO 97/02786</p> <p>(43) International Publication Date: 30 January 1997 (30.01.97)</p>																					
<p>(21) International Application Number: PCT/US96/11503</p> <p>(22) International Filing Date: 10 July 1996 (10.07.96)</p> <p>(30) Priority Data:</p> <table border="0"> <tr> <td>08/502,285</td> <td>13 July 1995 (13.07.95)</td> <td>US</td> </tr> <tr> <td>08/502,809</td> <td>14 July 1995 (14.07.95)</td> <td>US</td> </tr> <tr> <td>08/502,803</td> <td>14 July 1995 (14.07.95)</td> <td>US</td> </tr> <tr> <td>08/542,540</td> <td>13 October 1995 (13.10.95)</td> <td>US</td> </tr> <tr> <td>08/542,539</td> <td>13 October 1995 (13.10.95)</td> <td>US</td> </tr> <tr> <td>08/542,542</td> <td>13 October 1995 (13.10.95)</td> <td>US</td> </tr> <tr> <td>08/542,527</td> <td>13 October 1995 (13.10.95)</td> <td>US</td> </tr> </table> <p>(71) Applicant: FASTENETIX, L.L.C. [US/US]; Suite 102, 47 Maple Avenue, Summit, NJ 07901 (US).</p> <p>(72) Inventors: ERRICO, Joseph, P.; 9909-A Gable Ridge Terrace, Rockville, MD 20850 (US). ERRICO, Thomas, J.; 5 Crest Acre Court, Summit, NJ 07901 (US). RALPH, James, D.; 71 Manito Avenue, Oakland, NJ 07436 (US).</p> <p>(74) Agent: ERRICO, Joseph, P.; Fastenetix, L.L.C., 150 Douglas Road, Far Hills, NJ 07931 (US).</p>		08/502,285	13 July 1995 (13.07.95)	US	08/502,809	14 July 1995 (14.07.95)	US	08/502,803	14 July 1995 (14.07.95)	US	08/542,540	13 October 1995 (13.10.95)	US	08/542,539	13 October 1995 (13.10.95)	US	08/542,542	13 October 1995 (13.10.95)	US	08/542,527	13 October 1995 (13.10.95)	US	<p>(81) Designated States: AL, AM, AT, AU, AZ, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IS, JP, KE, KG, KP, KR, KZ, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, UZ, VN, ARIPO patent (KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).</p> <p>Published With international search report.</p>
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<p>(54) Title: A POLYAXIAL LOCKING MECHANISM</p> <p>(57) Abstract</p> <p>A polyaxial colletted locking mechanism for use with orthopedic apparatus includes a screw (170), hook (190), or other orthopedic implant element having a curvate head (172, 192), and a coupling element (100a). The coupling element (100a) has a tapered and colletted portion (102a) having an interior chamber (116a) in which the curvate head (172, 192) is initially polyaxially disposed. A locking collar (160) is disposed around the tapered and colletted portion (102a) such that translation thereof in the direction of the expanding taper causes the interior volume (116a) to contract onto the curvate head (172, 192) and lock it therein. The coupling element generally also includes a rod receiving recess (122a) in either the side or top thereof for receiving a rod of the total implant apparatus. The locking collar (160) may be caused to translate into its locking position by a mutual threading on the tapered portion and the collar, or by pressure applied to it by a separate element (150) which locks the rod in the channel.</p>																							

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A POLYAXIAL LOCKING MECHANISM

BACKGROUND OF THE INVENTION

1. Field of the Invention

5 This invention relates generally to a mechanism for polyaxially coupling and locking orthopaedic apparatus together so as to provide maximum surgical freedom and ease of use.

2. Description of the Prior Art

10 A variety of orthopaedic implant devices have been disclosed in the art for providing support to healing and/or fusing bone segments. These devices include bone plates, artificial joints, and rod immobilization implants. While affixation of such devices in many areas of the human body is often technically difficult, the need for variable angulability in implant devices which are used to immobilized segments of the spinal column is especially desirable. The spine is a highly complex system of bones and connective tissues which houses
15 and protects critical elements of the nervous system and the arterial and venous bodies in close proximity thereto. A variety of systems have been disclosed in the art which achieve this immobilization by implanting artificial assemblies in or on the spinal column.

 These assemblies may be classified as anterior, posterior, or lateral implants. As the classification suggests, lateral and anterior assemblies are coupled to the anterior portion of
20 the spine, which is the sequence of vertebral bodies. Posterior implants are attached to the back of the spinal column, generally hooking under the lamina and entering into the central canal, attaching to the transverse process, or coupling through the pedicle bone. The present invention relates to all such spinal fixation devices for immobilizing and altering the alignment of the spine by means of affixing at least one elongate rod to the sequence of selected bones.

25 These "rod assemblies" have a variety of pieces, including hooks, pedicle screws, and sacral blocks, each of which comprise a plurality of screws which are coupled to the rod. Pedicle screws are implanted through the posterior lateral surfaces of the laminae, through the pedicles, and into their respective vertebral bodies. The hooks are inserted under the lamina. The sacral block is coupled to the sacrum and receives the extreme end of the rod. It is the

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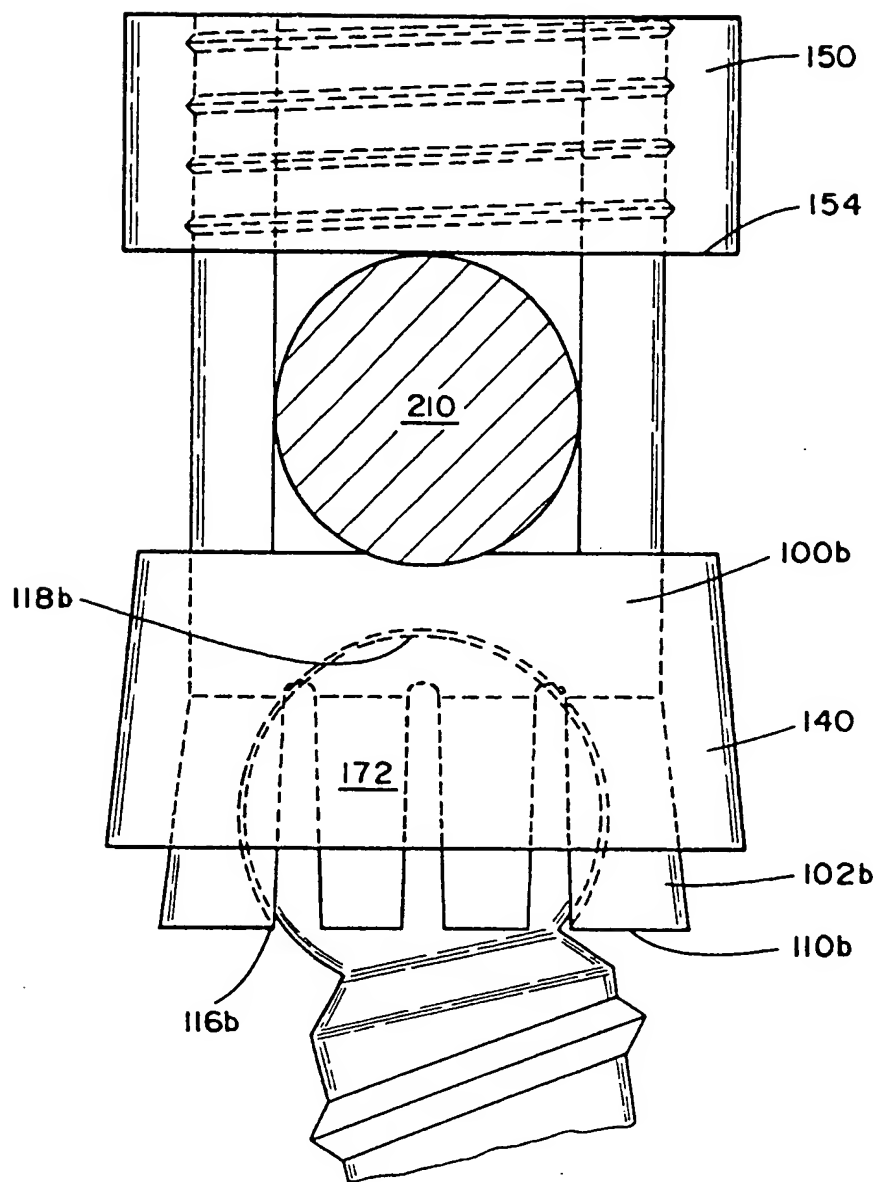


FIG. 8b

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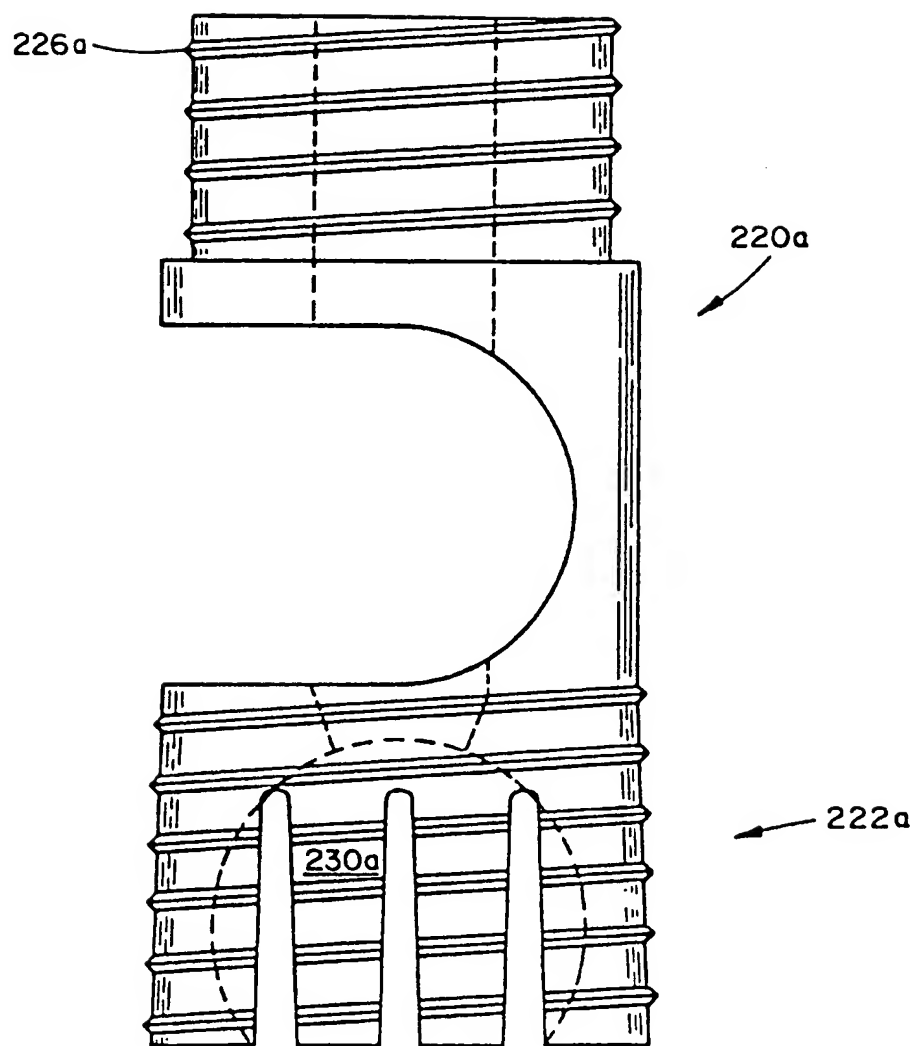


FIG. 9a

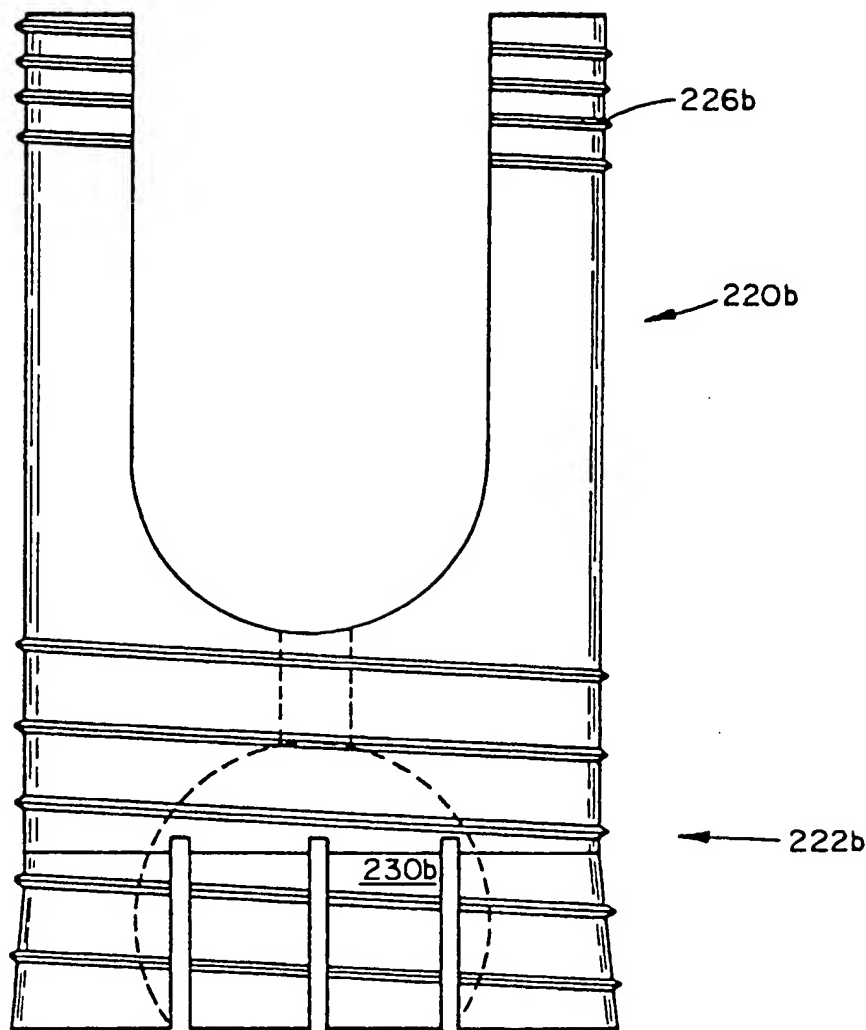


FIG.9b

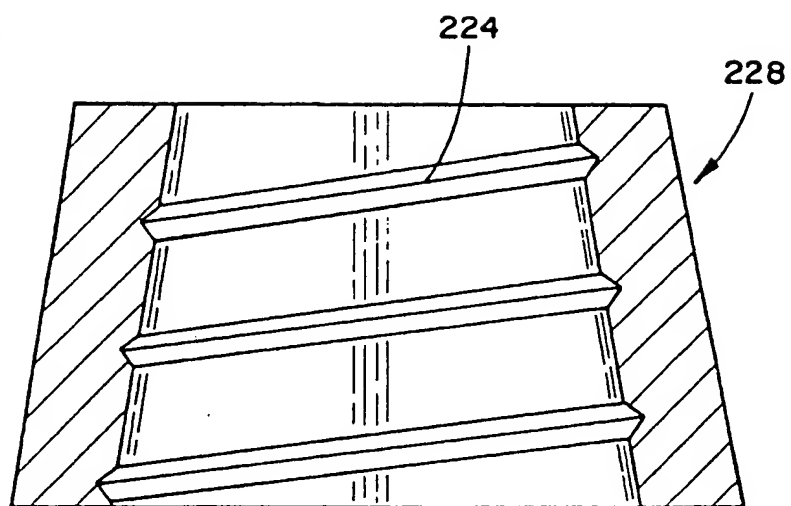


FIG. 10

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US96/11503

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) : A61B 17/70

US CL : 606/61

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 606/60, 61, 69-73, 75, 104; 623/16, 17

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X ---, P Y	US, A, 5,443,467 (BIEDERMANN ET AL.) 22 August 1995, see entire reference.	1, 2, 5-12 ----- 3, 4
Y, P	US, A, 5,476,464 (METZ-STAVENHAGEN ET AL.) 19 December 1995, see entire reference.	3
A, P	US, A, 5,534,001 (SCHLAPFER ET AL.) 09 July 1996, see entire reference.	6

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:	*T later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
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Date of the actual completion of the international search

01 OCTOBER 1996

Date of mailing of the international search report

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Name and mailing address of the ISA/US
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Washington, D.C. 20231

Facsimile No. (703) 305-3590

Authorized officer

GUY TUCKER

Telephone No. (703) 308-3271